# COMMUNITY ENERGY TOOLKIT

Inclusive Clean Energy Access by Empowering Communities through Community Energy Toolkit (COMET)

June, 2025 | Ali Mohammed

## INTRODUCTION

**Regional Context:** 

- □ Progress is stronger in Asia and the Pacific
- □ However, access is not always inclusive, equitable, or clean.
- Large disparities persist among rural, indigenous, island, and marginalized communities.
- □ Clean energy transition lags behind access expansion.

## **INCLUSIVITY GAP**

 Many communities are grid-connected but underserved.

- Challenges include affordability, reliability, gender exclusion, and lack of productive use.
- Energy poverty still exists even in connected households.
- Decisions are often top-down with little community input.

## **KEY CHALLENGES IN MINI-GRIDS EXPANSION**



### GAPS IN MINI-GRID DISCOURSE:

 Technological systems are messy, complex, socially constructed and society shaping. (Hughes 1987)

 Innovation, tools, methods focus on supply and distribution of electricity, and not end user or demand-side solutions.

### **DEMAND-SIDE CHALLENGES FOR RURAL MINI-GRIDS**

Mini-grids cannot scale due to these common **demand-related** challenges:

- Demand growth is slow customers are hesitant to pay connection fees or purchase and operate appliances if the costs and benefits of electricity service are unclear.
- Capacity is underutilized excess capacity is required to handle mismatches in peak supply and peak demand.
- Forecasts are unreliable demand estimation methods may not consider the impact of pricing and load management on user behavior and true willingness-to-pay.

## BRIDGING THE GAP WITH COMET



Mini-grid simulation software for exploring electricity demand, value and cost.



**BUILD CUSTOMER UNDERSTANDING** of complex technical concepts e.g. electricity costs, capacity constraints, benefits & value of electricity



VALIDATE COMMUNITY LOAD PROFILES and align community expectations and mini-grid design to build trust and increase adoption



ASSESS WILLINGNESS-TO-PAY & PROJECT RISK to reduce demand-side risk through improved understanding and forecasting

### **OUR SOLUTION**

COMET provides a **community-driven tool** for estimating and exploring different community demand profiles to optimize solar battery systems for both cost and accepted level of service.

Mini-grid developers benefit on **predicting and managing** end-user behavior as it helps them better meet available storage. This can only be done with effective **customer education**.



#### **Participant Experience**



#### **DEMAND EXPLORATION TOOL**

- Explore mini-grid scenarios through workshop modules, with community members role-playing household and business electricity use.
- Generate load profiles, reports and data analysis on end-user demand and payments.

#### **EDUCATIONAL TOOL**

- Introduce appliance ratings, metering, billing and other mini-grid concepts through an interactive format.
- Facilitate discussions, learning, and consensus building in an inclusive & trust-building environment.

## OCCMET -----Workshop facilitator **COMET** operator & host computer Router **COMET** participants & networked client computers / tablets

#### WORKSHOP MODULES:

- Demand exploration
  Demand stimulation
- Demand-side management Tariff & payment structures
- Productive use of energy
  All-female workshops

#### Projected live output

## CASE STUDY: FIJI (2023)



#### Impact:

- Accelerated data collection for renewable energy deployment
- Empowered communities with knowledge of energy consumption
- Created a scalable model for feasibility studies in other regions

**Project Partner:** ASU-LEAPS **Location:** Fiji – 75 rural communities assessed **Objective:** Feasibility study for mini-grid electrification

#### How COMET Was Used:

- Conducted demand exploration
  workshops across remote villages
- Collected real-time load profiles and willingness-to-pay data
- Simulated mini-grid scenarios for long-term energy planning
- Provided insights for developers on system sizing and financing

## **CASE STUDY**



#### Key benefit: COMET for demand stimulation.



#### DEMOGRAPHICS:

- ✓ 870 HH connections
- ✓ Agriculture and livestock-based economy

✓ Avg. monthly income: \$112. Avg. WTP - \$3.70

#### **KEY OUTCOMES:**

- ✓ Main PUE users: furniture factory, bakery, soap factory
- ✓ Main drivers of HH growth: rice cookers, fridges & irons
- ✓ E-cooking (rice cookers & kettles) behind HH peak time consumption



#### CASE STUDY: SOMALILAND (2021)

BD - Total Community Load



Key benefit: COMET for optimized storage sizing.

#### DEMOGRAPHICS:

- ✓ Pop.: 2,800 (360 HH, 102 bus., 14 public services)
- ✓ Border town economy: livestock & trading
- ✓ Average monthly income: \$100, WTP - \$10

#### **KEY OUTCOMES:**

- ✓ Demand depends on pricing and DSM
- ✓ Improved system utilization with ToU rates and load limits
- ✓ Community expectations aligned with pricing and DSM plan.

## **CURRENT STATUS**

## >100,000 people, 111 communities

#### impacted across 6 countries

(Clients: INGOs, ODAs, Government, Developers, Universities)

#### PAST / CURRENT

"It changed our understanding of electricity" — Abdulrazak Ahmed Mahmoud, Somaliland community member

**FUTURE PROJECTS** 

"COMET is the only tool designed specifically to help developers work with the community to explore their own long-term demand growth and usage behavior"

- Bernie Jones, Smart Villages UK managing director

## **Conclusion and Call to Action**

- □ Clean energy access must be inclusive to be sustainable.
- □ COMET bridges the gap between technology and community.
- □ Empowering communities leads to better outcomes for all.
- □ Let's scale up inclusive energy planning across Asia-Pacific.



## **THANK YOU**



**Digital X** 



Find out more: cometapp.net

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